Causality, Relativity and the EPR Paradox

Keele, Sept. 1981

Display Material:
3 views on interpretation of QM
5 versions of Non locality

1. Introduction Conflict between EPR and SR?
2. The Einstein Dilemma

   QM → Incompleteness v Non locality$_1$

3. The Bohr response to EPR Non locality$_2$
4. The Bell Inequality Non locality$_3$
5. The Stapp - Eberhard approach

   Counterfactuals and Nonlocality$_4$

6. The Bell Telephone Nonlocality$_5$
7. Conclusion Reconciliation of nonlocality and SR? — refer to paper for details on tachyons and the Causal Theory of Time?

Fine's Proof that Bell → $J.D._K$ — Kolmogorov.

But loc. → Bell ∴ loc. → $J.D._K$.

∴ $\sim$ J.D. → $\sim$ loc.

But J.D. here is joint distribution in sense ∃ prob space Γ s.t. observables can be represented as r.v.'s over Γ.

But does this imply $\sum a_n b_n$ → limit. ?

Hence J.D. for Fine is a Kolmogorov joint, whereas I deal with a limiting frequency joint.

~~Position~~ A

Five sources of Nonlocality
the following is forbidden:

Positions A B C pp 4-5.

Locality 1 unsharp → sharp p. 5

Locality 2 undefined → defined p. 6

Locality 3 sharp → sharp p. 8

Locality 4 macroscopic version p. 8

Locality 5 Statistics changed at a distance p. 17

PLeD p. 13

Violation of Locality

Type of Locality violated / View of QM	1 unsharp to sharp	2 undefined to defined	3 sharp to sharp	4 macroscopic	5 statistical
A	X	X	✓	✓	X
B	✓	X	X	X (?)	X
C	X	✓	X	X	X